

# Iten Industries and NASA Glenn Open a New Window of Opportunity with X-Aerogels



## TECHNOLOGY

Aerogels are the strongest, least dense solid materials known with outstanding insulation properties but suffer from brittleness and moisture absorption. NASA GRC resolved these problems by coating conformally and cross-linking the individual skeletal aerogel nanoparticles with engineering polymers such as isocyanates, epoxies, and polyimides. This approach, termed X-Aerogel, offers significant improvements in the material's environmental durability and overall strength.

## COMMERCIAL APPLICATION

Iten Industries is a manufacturer of composite materials and process solutions. In order to remain competitive, Iten recognized the importance of developing new materials designed to meet their customers' desired specifications. In 2006, through a GATE (Glenn Alliance for Technology Exchange) Partnership Award, Iten partnered with NASA Glenn Research Center to develop an efficient production method for the X-Aerogel technology. NASA GRC developed a method of conformal polymer crosslinking of an aerogels silica structure, creating a mechanically and environmentally robust aerogel material. The X-Aerogel could enable innovative, lightweight and energy-efficient products but requires extensive and expensive process and handling capabilities. Iten successfully demonstrated the feasibility of an efficient bench-scale manufacturing process reducing handling, cure and dwell times, and recycling solvents. Also, Iten developed several X-Aerogel formulations for client-specific applications.



*Iten Industries processes both thermoplastic and thermoset polymers.*

## SOCIAL/ECONOMIC BENEFIT

Soaring energy costs and the potential environmental impact of depleting fossil fuel resources requires advancement in harnessing energy and efficiency in using energy. It is estimated that nationwide, buildings consume 39% of the energy (and 70% of the electricity) generated in the U.S. The X-Aerogel, although a little denser than traditional aerogels, maintains the insulation properties of traditional aerogels. A single one-inch thick window made from aerogel provides the same insulation as stacking 32 panes of glass. Iten Industries, through its partnership with NASA Glenn and the GATE Partnership Award, is working to make X-Aerogel an affordable, energy efficient alternative building material.

## NASA APPLICATIONS

NASA's space exploration goals include building habitats on both the moon and Mars. Building materials for the habitats, transported by a space vehicle, must be light weight, compact, mechanically and environmentally robust, and provide several benefits including thermal insulation, radiation protection, and electrostatic dissipation. Innovative materials like the X-Aerogel enable long-duration human space exploration and habitation, contributing to increased payload of the space vehicle, allowing lightweight structures to be easily transported and erected in space, and even insulating extravehicular activity suits.

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